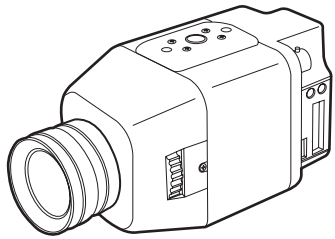
Installation/Operation

MC3500/MC3600 Series Monochrome Cameras

C1982M-A (12/00)



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IMPORTANT SAFEGUARDS AND WARNINGS

Prior to installation and use of this product, the following WARNINGS should be observed.

1. Installation and servicing should only be done by qualified service and installation personnel.
2. Installation shall be done in accordance with all local and national electrical and mechanical codes utilizing only approved materials.
3. Use only installation methods and materials capable of supporting four times the maximum specified load.
4. Use only UL listed class 2 power supply.
5. To prevent fire or shock hazard, do not expose this appliance to rain or moisture.

DD/AI Lens Connector
The maximum load for a direct drive lens must not exceed 25 mA.
The maximum load for an auto-iris lens must not exceed 50 mA.

REGULATORY NOTICES

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device many not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

DESCRIPTION

The MC3500 and MC3600 Series are compact, monochrome video cameras with a 1/3-inch CCD imager. All cameras have a direct drive/auto iris lens connector and adjustable back focus, and accept C and CS lenses.

Models

MC3500S-2	Standard resolution, 330 TV lines, HyperHAD™ CCD, 1.0 lux at f1.2, EIA
MC3500S-2X	Standard resolution, 380 TV lines, Hyper HAD+ CCD, 0.1 lux at f1.2, CCIR
MC3600H-2	High resolution, 480 TV lines, EXview HAD CCD™, 1.0 lux at f1.2, EIA
MC3600H-2X	High resolution, 570 TV lines, EXview HAD+ CCD 0.05 lux at f1.2, CCIR

CAMERA LAYOUT

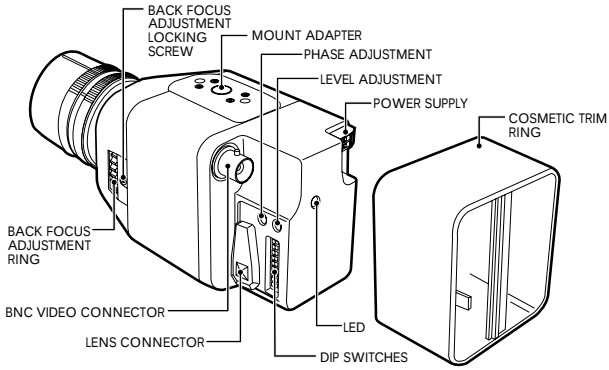


Figure 1. Camera Layout

NOTE: The cosmetic trim ring conceals the LED light for more discreet surveillance operations. The trim ring also hides the power connectors and protects the DIP switches.

INSTALLATION

Lens Mounting

The MC3500 and MC3600 Series cameras can use fixed iris, manual iris, auto iris, or direct drive lenses. Cameras are factory-set for CS-mount lenses, but easily adjusted for C-mount lenses.

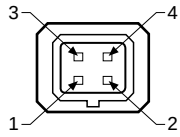
1. **C-Mount Lens Only -** Loosen the two back focus locking screws. Rotate the back focus adjustment ring fully counterclockwise before installing the C-mount lens (refer to the section on *Back Focus Adjustment*).

2. Remove the cosmetic trim ring from the back of the camera (refer to Figure 1). Set the lens mode selector switch on the side of the camera to AI (auto iris video drive lens)or DD (auto iris DC drive lens). Refer to the *Switch Settings* section. Switch setting is determined by the type of lens used.

3. Screw the lens onto the lens mount. Be careful to prevent dust from entering the space between the lens and the CCD element. If necessary, use clean, compressed air to remove any foreign matter.

4. Thread the lens cable through the cosmetic trim ring.

5. Connect the direct drive (DD) or auto iris (AI) lens to the 4-pin iris drive connector located on the side of the camera. Refer to Figure 2 for the pin connections for the iris drive connector.



PIN	DD LENS CONNECTIONS	AI LENS CONNECTIONS
1	Control coil negative (-)	Not used
2	Control coil positive (+)	Lens positive supply
3	Drive coil positive (+)	Video drive signal
4	Drive coil negative (-)	Ground

Figure 2. DD/AI Lens Connector

Camera Mounting

Use a standard 1/4-20 screw (provided) with a maximum thread length of 3/8-inch (10 mm) for top or bottom camera mounting. The mount adapter may be fitted to the top or bottom of the camera. The camera is shipped with the mount adapter located on the top of the camera.

To change the mount adapter position:

1. Remove the four screws from the mount adapter located on the top of the camera.
2. Remove the trim cover from the bottom of the camera by prying it loose. Place the trim cover on the top of the camera where the mount adapter was removed. Press into place.
3. Install the mount adapter to the bottom of the camera. Secure with the four screws removed in step 1.

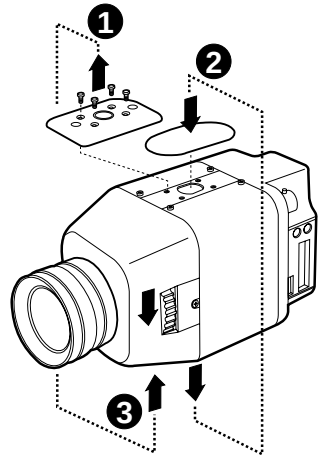


Figure 3. Camera Mounting

POWER AND VIDEO CONNECTIONS

To connect the camera power and video do the following:

1. Remove the rear cover from the camera (refer to Figure 1). Thread cabling through the rear cover.
2. Connect the power cable to the two pin power connector on the back of the camera using the terminal block connector provided. Refer to Table A for the recommended wire gauge to use for the installation
3. Connect a video cable to the SIGNAL OUT connector (BNC) on the back of the camera. Refer to Table A for the type of the video coaxial cable to use.
4. Reattach the rear cover to the back of the camera.

Power Connections

MC3500 and MC3600 Series cameras are designed to operate from a 12 VDC or 24 VAC power supply. The power supply connections are shown in Figure 4. The LED on the back panel of the camera indicates that power is connected. Use only a Class 2 isolated power supply. Power consumption is less than 4 watts.

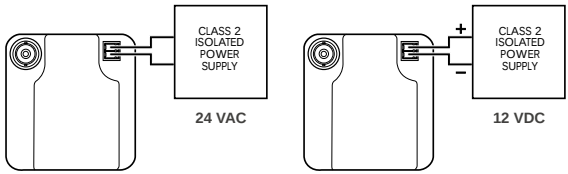


Figure 4. Power Supply Connections

To connect the camera power and video:

1. Remove the cosmetic trim ring from the camera (refer to Figure 1). Thread cabling through the rear cover.
2. Connect the power cable to the two pin power connector on the back of the camera using the terminal block connector (provided). Refer to Table A for the recommend wire gauge and wiring distances.
3. Connect a video cable to the SIGNAL OUT connector (BNC) on the back of the camera. Refer to Table B for the type of video coaxial cable to use.
4. Reattach the trim ring to the back of the camera.

AC Operation Only – If you are wiring more than one camera to the same transformer, connect one side of the transformer to the same terminal on all cameras, and connect the other side of the transformer to the remaining terminal on all cameras. Failure to connect all of the cameras the same way will cause the cameras to be out of phase with each other and may produce a vertical roll when switching between cameras.

Table A. Recommended Wire Gauge and Wiring Distances

The following are the recommended maximum distances for 24 VAC applications and are calculated with a 10-percent voltage drop. (Ten percent is generally the maximum allowable voltage drop for AC-powered devices.)

Wire Gauge

Total vA	20 (0.5 mm^2)	18 (1.0 mm^2)	16 (1.5 mm^2)	14 (2.5 mm^2)	12 (4.0 mm^2)	10 (6.0 mm^2)
10	283 (86)	451 (137)	716 (218)	1142 (348)	1811 (551)	2880 (877)

EXAMPLE: A camera that requires 10 vA and is installed 283 feet (86 m) from the transformer would require a minimum wire gauge of 20 AWG.

NOTE: Distances are calculated in feet; values in parentheses are meters.

Table B. Video Coaxial Cable Requirements

Cable Type*	Maximum Distance
RG59/U	750 ft (229 m)
RG6/U	1,000 ft (305 m)
RG11/U	1,500 ft (457 m)

* Minimum cable requirements:
  75 ohms impedance
  All-copper center conductor
  All-copper braided shield with 95% braid coverage

LENS SETUP AND FOCUS PROCEDURES

Video Drive Auto Iris Lens

When a video drive auto iris lens is used, the lens mode selector switch must be set to AI. Switch the EI and AGC OFF. Refer to the lens instructions and adjust the lens for the optimum picture (video output level of 1V peak-to-peak). Switch the AGC ON. To focus, fully open the iris by covering the lens with a suitable neutral density (ND*) filter. If the viewed scene is 6.5 feet (2 m) away or farther, set the lens focus to infinity (far). Use the back focus adjustment ring (refer to the *Back Focus Adjustment* section) and focus on the selected scene. Remove the ND filter and set the lens focus as required.

Direct Drive (DC) Auto Iris Lens

When a direct drive lens is used, the lens mode selector switch must be set to DD. Switch the EI and AGC OFF. Use an appropriate screwdriver to turn the lens level potentiometer (refer to Figure 1) fully clockwise. Next, slowly adjust the potentiometer counterclockwise until the optimum picture is obtained (video output level of 1V peak-to-peak). Switch the AGC ON. To focus, fully open the iris by covering the lens with a suitable neutral density (ND*) filter. Select the scene to be viewed. If the viewed scene is 6.5 feet (2 m) away or farther, set the lens focus to infinity (far). Use the back focus adjustment ring (refer to the *Back Focus Adjustment* section) and focus on the selected scene. Remove the ND filter and set the lens focus as required.

Fixed Lens

Set the EI switch and AGC switch to ON. To focus, set the lens focus to infinity and view an image greater than 6.5 feet (2 m) away. Focus the image with the back focus adjustment ring (refer to the *Back Focus Adjustment* section). Set the lens focus as required.

Manual Iris Lens

Set the EI switch and AGC switch to ON. To focus, open the iris fully and set the lens focus to infinity. View an image greater than 6.5 feet (2 m) away. Focus the image with the back focus adjustment ring (refer to the *Back Focus Adjustment* section). Adjust the lens focus and set the iris for the best picture quality. The largest aperture gives the best light sensitivity, the smallest aperture the greatest depth of field.

Zoom Lens

Set the lens focus to infinity (far) and fully open the iris by covering the lens with a suitable neutral density (ND*) filter. Zoom out to the widest field of vision and view a distant object. Adjust the back focus adjustment ring until the object is in focus (refer to the *Back Focus Adjustment* section). Next, zoom fully in and adjust the lens focus until the object is again focused. Repeat these steps until the full zoom range may be viewed with the minimum loss of focus.

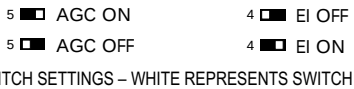


Figure 5. AGC and EI Switch Settings

*NOTE: For best results, outdoors, use an ND3 filter.

BACK FOCUS ADJUSTMENT

The back focus adjustment is located at the front of the camera and is accessible from either side of the case.

To adjust the back focus:

1. Loosen the two back focus locking screws (one on each side).

2. Turn the back focus ring:

   a. Clockwise - Moves the CCD sensor assembly towards the back of the lens.
   b. Counterclockwise - Moves the CCD sensor away from the lens.

3. When the back focus adjustment is satisfactory, tighten the locking screws. Do not over-turn or force the back focus adjustment ring.

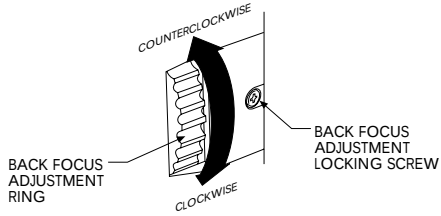


Figure 6. Back Focus Adjustment

SWITCH SETTINGS

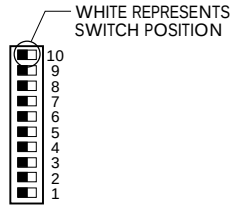


Figure 7. Switch Settings

10 LL/INT Synchronization Selection

Locks the frame rate to the power supply frequency. Eliminates vertical roll caused by multiple cameras connected to the same switching device. Each camera output is synchronized to the frequency of the power supply. Set the camera synchronization mode to one of the following:

Line Lock (LL) - Line-locks frame rate of cameras.

INT - Disables line lock.

10 LL

10 INT

9 Lens Mode Selector (AI/DD Switch)

The AI/DD switch setting is determined by the type of lens used:

AI - Auto iris lens

DD - Direct drive lens

9 AI

9 DD

8 Sharpness OFF/Sharpness SHP

This switch can be used to enhance detail in the image. Set the switch to SHP to enhance the sharpness of the edges of the objects in the picture.

8 OFF

8 SHP

7 Gamma LO/Gamma HI

Two different gamma correction options are available:

Gamma HI - Linear response.

Gamma LO - Increases visibility in dark areas of the picture.

7 HI

7 LO

6 AGC HI/AGC NORM

This switch sets the AGC (Automatic Gain Control) feature of the camera. Two settings are available. Selecting AGC HI will allow the camera's AGC circuit to apply more gain to the video signal but may result in slightly more noise in the picture.

6 HI

6 NORM

5 AGC OFF/AGC ON

Automatically adjusts the image to compensate for low light levels when using fixed or manual iris lenses.

ON - Enables the AGC mode.

OFF - Disables the AGC mode.

5 AGC

5 OFF

❹ EI ON/EI OFF (Electronic Iris)

The EI (Electronic Iris) feature compensates for an excessive light level by automatically adjusting shutter speed. When the EI is ON, the DD lens level potentiometer on the side of the camera may be used to adjust the EI threshold level. The level is factory set to 1V peak-to-peak.

OFF - Disables the Electronic Iris mode. Use with auto iris/direct drive lenses.

ON (Default setting) **-** Enables the Electronic Iris mode. Use with fixed or manual iris lenses.

❸ and ❷ BLC - Backlight Compensation

Use the BLC (Backlight Compensation) when a bright light source is behind the subject of interest. If a strong background light such as a window exists, the camera will compensate by reducing the overall exposure, making the areas surrounding the window too dark. Use the BLC feature to control the exposure of the scene.

Typically, the image in the center of the picture is used to calculate the exposure. The edges where strong backlighting is likely to be are ignored.

BLC will function with a manual iris lens when the Electronic Iris feature is switched ON. For direct drive and auto iris lenses, BLC will still function even though the Electronic Iris feature is switched OFF.

Three active zones are available when setting the Backlight Compensation mode. The lighting from within the selected BLC active zone (the dark areas in Figure 8) is used to calculate the scene exposure. To select a zone:

1. Set the WND ON/OFF switch to ON. This will superimpose the selected zone onto the monitor.
2. Use switches 3 and 2 to select one of the BLC active zones (refer to Figure 8).
3. Set the overlay window switch to OFF.

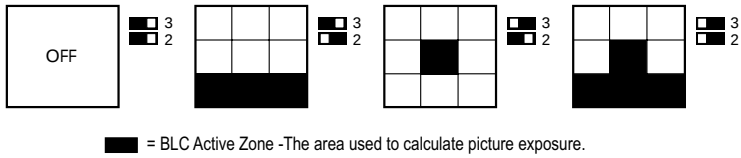
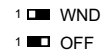


Figure 8. BLC Setup Switches

❶ WND ON/WND OFF - BLC Setup Window

This switch allows you to turn the BLC window video overlay on or off. The overlay is used in conjunction with switches 8 and 9 as an aid to setting the Backlight Compensation feature.



CAMERA PHASE ADJUSTMENT

When using one AC power supply in a multi camera system, a brief vertical roll may occur on the monitor each time a camera view is switched. To eliminate vertical roll, adjust the phase control to synchronize (line-lock), the cameras to one another. The synchronization switch (DIP switch 10) for each camera must be set to LL. Use the potentiometer located on the side of the camera to make adjustments.

It may be necessary to have two people in communication when adjusting the phase of the camera. One person at the camera and another person at the monitor to observe the vertical roll and the effect of any adjustments made to the camera.

To synchronize the cameras do the following:

1. Choose a reference camera to which all other cameras will be phased.

2. Select a camera and synchronize it to the reference camera by turning the phase adjustment control clockwise and/or counterclockwise.

3. Each time an adjustment is made, switch back and forth between the camera you are adjusting and the reference camera. Repeat this process as many times necessary, until the roll between the cameras is no longer noticeable.

4. Adjust the phase of all other cameras by repeating steps 2 through 3. Always adjust to the reference camera selected in step 1.

NOTE: The preferred method for camera phase adjustment is to use a dual trace oscilloscope to align the vertical sync pulses of the reference camera to the selected camera(s).

SPECIFICATIONS

GENERAL

CCD Sensor:	1/3-inch
Synchronization System:	AC line lock or internal oscillator
Horizontal Resolution	
MC3500S-2:	380 TV lines
MC3600H-2:	570 TV lines
Iris Control:	Electronic/passive
Minimum Illumination	
MC3500S-2:	0.1 lux at f1.2
MC3600H-2:	0.05 lux at f1.2
Signal-to-Noise Ratio	52 dB (AGC Off)
Gain Control:	Automatic
Vertical Phase:	Adjustable 0° ±120°
Automatic Gain Control:	Selectable by DIP switch setting
Backlight Compensation:	Selectable by DIP switch setting
Scanning System	525 lines, 2:1 interface
Auto Iris Lens Type:	DC/video control
Video Output:	1 Vp-p, 75 ohms
Iris Control Range	1/60 - 1/100,000 second

ELECTRICAL

Power Requirements:	14-30 VAC
	11-40 VDC
Power Connector:	2-pin terminal strip, push-in type
Video Connector:	BNC
Lens Jack:	4-pin connector (miniature square)
Power Consumption:	Less than 4 watts

MECHANICAL

Lens Mount	C/CS mount (adjustable)
Camera Mount	Use 1/4-20 screw, top or bottom of camera housing

ENVIRONMENTAL

Operating Temperature:	14° to 122°F (-10° to 50°C)
Storage Temperature:	14° to 158°F (-10° to 70°C)

PHYSICAL

Dimensions:	2.48 (W) x 2.67 (H) x 4.33 (D) inches (6.3 x 6.8 x 11 cm)
Weight (without lens):	0.77 lb (0.35 kg)

(Design and product specifications subject to change without notice.)

PRODUCT WARRANTY AND RETURN INFORMATION

WARRANTY

Pelco will repair or replace, without charge, any merchandise proved defective in material or workmanship **for a period of one year** after the date of shipment.

Exceptions to this warranty are as noted below:

- Five years on FT/FR8000 Series fiber optic products.
- Three years on Genex® Series products (multiplexers, server, and keyboard).
- Three years on Camclosure® and fixed camera models, except the CC3701H-2, CC3701H-2X, CC3751H-2, CC3651H-2X, MC3651H-2, and MC3651H-2X camera models, which have a five-year warranty.
- Two years on standard motorized or fixed focal length lenses.
- Two years on Legacy®, CM6700/CM6800/CM9700 Series matrix, and DF5/DF8 Series fixed dome products.
- Two years on Spectra®, Esprit®, ExSite™, and PS20 scanners, including when used in continuous motion applications.
- Two years on Esprit® and WW5700 Series window wiper (excluding wiper blades).
- Eighteen months on DX Series digital video recorders, NVR300 Series network video recorders, and Endura™ Series distributed network-based video products.
- One year (except video heads) on video cassette recorders (VCRs). Video heads will be covered for a period of six months.
- Six months on all pan and tilts, scanners or preset lenses used in continuous motion applications (that is, preset scan, tour and auto scan modes).

Pelco will warrant all replacement parts and repairs for 90 days from the date of Pelco shipment. All goods requiring warranty repair shall be sent freight prepaid to Pelco, Clovis, California. Repairs made necessary by reason of misuse, alteration, normal wear, or accident are not covered under this warranty.

Pelco assumes no risk and shall be subject to no liability for damages or loss resulting from the specific use or application made of the Products. Pelco's liability for any claim, whether based on breach of contract, negligence, infringement of any rights of any party or product liability, relating to the Products shall not exceed the price paid by the Dealer to Pelco for such Products. In no event will Pelco be liable for any special, incidental or consequential damages (including loss of use, loss of profit and claims of third parties) however caused, whether by the negligence of Pelco or otherwise.

The above warranty provides the Dealer with specific legal rights. The Dealer may also have additional rights, which are subject to variation from state to state.

If a warranty repair is required, the Dealer must contact Pelco at (800) 289-9100 or (559) 292-1981 to obtain a Repair Authorization number (RA), and provide the following information:

1. Model and serial number
2. Date of shipment, P.O. number, Sales Order number, or Pelco invoice number
3. Details of the defect or problem

If there is a dispute regarding the warranty of a product which does not fall under the warranty conditions stated above, please include a written explanation with the product when returned.

Method of return shipment shall be the same or equal to the method by which the item was received by Pelco.

RETURNS

In order to expedite parts returned to the factory for repair or credit, please call the factory at (800) 289-9100 or (559) 292-1981 to obtain an authorization number (CA number if returned for credit, and RA number if returned for repair).

All merchandise returned for credit may be subject to a 20% restocking and refurbishing charge.

Goods returned for repair or credit should be clearly identified with the assigned CA or RA number and freight should be prepaid. Ship to the appropriate address below.

If you are located within the continental U.S., Alaska, Hawaii or Puerto Rico, send goods to:

Service Department
Pelco
3500 Pelco Way
Clovis, CA 93612-5699

If you are located outside the continental U.S., Alaska, Hawaii or Puerto Rico and are instructed to return goods to the USA, you may do one of the following:

If the goods are to be sent by a COURIER SERVICE, send the goods to:

Pelco
3500 Pelco Way
Clovis, CA 93612-5699 USA

If the goods are to be sent by a FREIGHT FORWARDER, send the goods to:

Pelco c/o Expeditors
473 Eccles Avenue
South San Francisco, CA 94080 USA
Phone: 650-737-1700
Fax: 650-737-0933

REVISION HISTORY

Manual #	Date	Comments
C1982M	10/00	Original version.
C1982M-A	12/00	Added cosmetic trim ring information.